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# NAVAL POSTGRADUATE SCHOOL MONTEREY, CALIFORNIA



## THESIS

**SURFACE WARFARE JUNIOR OFFICER  
SEPARATION: DOES SHIP TYPE MAKE A  
DIFFERENCE?**

by

Glenn E. Bautista

March, 1996

Thesis Co-Advisors:

Alice C. Crawford  
Mark J. Eitelberg

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**SURFACE WARFARE JUNIOR OFFICER  
SEPARATION: DOES SHIP TYPE  
MAKE A DIFFERENCE?**

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Submitted in partial fulfillment  
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**MASTER OF SCIENCE IN SYSTEMS MANAGEMENT**

from the

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## **ABSTRACT**

This thesis examines the relationship between ship type and separation by Surface Warfare junior officers. The data used in this thesis were taken from the Navy's Officer Master Tapes (OMT), provided by the Center for Naval Analyses, and Officer Promotion History Data Files, collected by the Department of the Navy for all officers. A total of 8,260 officers who entered the Navy from 1976 to 1990 were analyzed by ship mission category; and an additional 2,125 officers who were screened for Lieutenant Commander from 1986-1994 were analyzed by ship mission, ship class, and individual ship. The results revealed relatively higher separation rates among officers who were initially assigned to an aircraft carrier and disparities between the proportion of officers who attained career milestones (e.g., SWO qualification, Department Head Screen, and promotions). These factors, combined with personal characteristics (such as marital status and undergraduate performance) played a larger role in the separation decision than any one single factor. Specific recommendations for further research are provided.





## TABLE OF CONTENTS

I.	INTRODUCTION AND BACKGROUND . . . . .	1
A.	BACKGROUND . . . . .	2
B.	SCOPE AND FOCUS . . . . .	4
C.	BENEFITS . . . . .	5
II.	LITERATURE REVIEW . . . . .	7
A.	TASTE FACTORS . . . . .	7
B.	CAREER MILESTONE FACTORS . . . . .	11
C.	PERSONAL CHARACTERISTICS . . . . .	13
D.	SHIP CHARACTERISTICS . . . . .	17
E.	SUMMARY . . . . .	20
III.	METHODOLOGY . . . . .	21
A.	OVERVIEW . . . . .	21
B.	DATA . . . . .	22
C.	VARIABLE EXPLANATION . . . . .	24
1.	Dependent Variable - "Taste" Factors .	24
2.	Independent Variables . . . . .	25
a.	Personal Characteristics . . . . .	25
(1)	Age. . . . .	25
(2)	Race. . . . .	25
(3)	Marital Status. . . . .	25
(4)	Education. . . . .	26
b.	Career Milestones . . . . .	26

c.	Ship Characteristics . . . . .	26
d.	Interactive Variable . . . . .	27
IV.	ANALYSIS . . . . .	29
A.	DESCRIPTIVE STATISTICS . . . . .	29
1.	Sample Composition . . . . .	29
2.	Expectations . . . . .	30
a.	Age at Accession . . . . .	30
b.	Marital Status . . . . .	31
c.	Race . . . . .	31
d.	Graduate Education . . . . .	31
e.	College GPA . . . . .	32
f.	Accession Source . . . . .	32
g.	Career Milestones . . . . .	33
h.	Ship TYPE . . . . .	33
B.	SEPARATION RATES . . . . .	33
1.	Ship Characteristics: TYPE, CLASS, UNIT . . . . .	33
a.	CNA Data Set . . . . .	33
b.	Bowman Data Set . . . . .	34
(1)	Ship TYPE. . . . .	35
(2)	Ship CLASS. . . . .	35
(3)	Ship UNIT. . . . .	36
2.	Career Phases . . . . .	37
a.	Trends . . . . .	38
b.	Causes . . . . .	39

3.	Age . . . . .	39
	a. Trends . . . . .	40
	b. Causes . . . . .	40
4.	Race . . . . .	41
	a. Trends . . . . .	41
	b. Causes . . . . .	42
5.	Marital Status . . . . .	43
	a. Trends . . . . .	43
	b. Causes . . . . .	44
6.	Graduate Education . . . . .	46
	a. Trends . . . . .	46
	b. Causes . . . . .	47
7.	College Grade Point Average . . . . .	48
	a. Trends . . . . .	49
	b. Causes . . . . .	50
8.	Accession Source . . . . .	50
	a. Trends . . . . .	50
	b. Causes . . . . .	51
9.	Career Milestones . . . . .	52
	a. Trends . . . . .	52
	b. Causes . . . . .	57
10.	Lateral Transfer . . . . .	58
	a. Trends . . . . .	58
	b. Causes . . . . .	58
C.	LOGIT ANALYSES . . . . .	59
1.	TERMER Phase . . . . .	59

a.	Significant Variables . . . . .	59
b.	Common Characteristics of Leavers .	60
2.	DOUBTER Phase . . . . .	61
a.	Significant Variables . . . . .	61
b.	Common Characteristics . . . . .	62
3.	CAREER Phase . . . . .	63
a.	Significant Variables . . . . .	63
b.	Common Characteristics . . . . .	64
4.	Exploratory Analysis . . . . .	65
a.	Performance Measures . . . . .	65
(1)	Significance. . . . .	65
(2)	Interpretation. . . . .	65
(3)	Limitation. . . . .	66
b.	Interactive Variable . . . . .	66
(1)	Significance. . . . .	66
(2)	Interpretation. . . . .	66
c.	Indirect Effects . . . . .	66
D.	SUMMARY . . . . .	69
V.	CONCLUSIONS AND RECOMMENDATIONS . . . . .	71
A.	CONCLUSIONS . . . . .	71
1.	Primary Focus: Ship Type . . . . .	71
2.	Secondary Issues . . . . .	74
B.	RECOMMENDATIONS . . . . .	75
APPENDIX A	. . . . .	79

APPENDIX B . . . . .	83
LIST OF REFERENCES . . . . .	91
INITIAL DISTRIBUTION LIST . . . . .	93

## I. INTRODUCTION AND BACKGROUND

A combination of many factors may affect a person's decision to leave the Navy. Over the years, a great deal of research has explored the question of why high-quality officers and enlisted personnel choose to end their service. Much of the research has focused on the economic aspects of the decision to separate. At the same time, there has been less study of the conditions of military service -- such as location of assignment, occupational demands, and the like -- as a potential cause of a member's decision to leave or stay on active duty.

This study looks specifically at one community of Naval officers and an aspect of their service that may somehow be related to the separation decision. The research focuses on separation trends among Surface Warfare junior officers. The research identifies common characteristics of Surface Warfare junior officers who decide to separate from the Navy, determines the significance of ship type in the separation decision, and explores the relationship between these findings and current policies. Ultimately, the study seeks to answer the question, "What role does ship type play in the separation of Surface Warfare junior officers; does ship type make a difference?"

## **A. BACKGROUND**

To aspiring Surface Warfare officers, command of a surface combatant is the apex of an extensive training program. These officers spend a majority of their careers at sea where they gain experience and seamanship skills that are necessary to succeed. However, not every Ensign screens for command. Some remain on active duty, never screening; others may opt to separate from the Navy. Those who separate do so for a variety of reasons.

One reason for separation may involve an individual's initial sea tour. The initial sea tour plays a crucial role in a Surface Warfare officer's career. It is during this tour that junior officers must demonstrate the ability and the perseverance to achieve warfare qualification while simultaneously attending to their division officer duties. Low performance in either of these functions could spell the end of a Naval career.

A junior officer's performance as a Surface Warfare officer or a division officer, however, does not tell the whole story. Previous studies suggest that ship type is related to enlisted attrition rates (Kear, 1989) and officer separation and promotion rates (Bellamy, 1991). This being the case, if a high separation rate is consistently observed

for a particular ship, ship class, or ship type, it is possible that an underlying cause for separation may stem from differences in opportunity between ships.

It is possible that individuals possessing the same ability may succeed or fail based primarily on the type of ship for which they are assigned. For example, an officer may be unable to distinguish himself or herself among a large wardroom onboard an aircraft carrier and may not attain warfare qualification. The result may be separation upon completion of the initial service obligation. Conversely, the same individual, when assigned to a frigate with a small wardroom may be able to quickly prove his or her ability. The same individual, with the same ability, succeeds or fails based primarily on a different working environment related to ship type.

Moreover, initial assignment may prove to be the deciding factor in a junior officer's decision to separate. That is, initial assignment to a particular type of ship may result in a later assignment to the same type of ship. A Surface Warfare officer who has performed well on a cruiser or destroyer platform is likely to carry the association of service on that type of ship throughout his or her early career. Later, when screening for Executive Officer (XO), the individual will possess the qualifications necessary to become a cruiser/destroyer XO. At the same time, another individual assigned to an amphibious platform may not



possess the same qualifications. As a result, the individual is limited to amphibious platforms. Being fewer in number, amphibious platforms may thus decrease the individual's opportunities, possibly influencing the individual to separate from service.

## **B. SCOPE AND FOCUS**

This thesis focuses on the relationship between separation and ship type for Surface Warfare junior officers. An analysis is conducted of separation rates as a function of ship mission. Additionally, an empirical model is developed to estimate the probabilities of an officer's separation based on ship characteristics.

Two data sets are analyzed to determine significant causal factors in the separation decision. One data set consists of files based on longitudinal histories of officers who entered the Navy between Fiscal Years 1976 and 1990. The second data set contains files of officers screened for Lieutenant Commander (LCDR) from 1986 to 1994. The sample consists of Surface Warfare junior officers who completed their initial service obligation and is restricted to men, commissioned as Ensigns in the Surface Warfare community (designator - 116X), who accumulated less than one year of enlisted service. (The restriction on enlisted

service eliminates bias associated with officers who have accumulated time on active duty and may be more likely continue Naval service.)

The target group is Surface Warfare officers who have opted to remain in service past the minimum service requirement. All have entered the Navy via the Surface Warfare community and possess minimal prior military experience. In effect, the sample describes the typical college graduate, entering the Surface Warfare community, who has opted to remain in service.

#### **C. BENEFITS**

The study will permit a better understanding of the probability of separation or retention of Surface Warfare officers who have reached the mid-career point. These are basically junior officers who have demonstrated a strong inclination for making the Navy a career and are eligible for promotion to LCDR, but are still somewhat undecided as to their continued service.

An added benefit of the study is derived from the ability to identify characteristics that are common to officers at different points in their careers. For example, if individuals who separate at the end of their minimum service requirement possess the same characteristics as those who separate later, then it is possible that ship type played a role in their decision to separate.

As such, the study's attempt to determine a relationship between ship type and separation may uncover deficiencies in current policies. More importantly, it allows manpower planners to focus their attention on individuals who are at the career-decision point, modify policies to remove inherent weaknesses, and prevent the needless loss of resources.

## **II. LITERATURE REVIEW**

The prevailing question in previous studies of officer separation revolves around the possible causes of a person's decision to end their career. Analysts have explored the issue by focusing on factors associated with separation, and slanting the research toward a particular area of interest (i.e., minority issues, force reductions, etc.). Yet, despite numerous variations on the same theme, separation studies consistently incorporate concepts addressed by Warner and Goldberg (1984) in their Annualized Cost of Leaving (ACOL) Model. Basically, the ACOL Model weighs the motivation for continued service against a person's desire to enter civilian life. Certain factors, be it professional or personal in nature, play into the separation decision throughout an officer's career. These factors include many of the ACOL "taste" factors, attainment of career milestones, personal characteristics, and ship characteristics. These topics are discussed below.

### **A. TASTE FACTORS**

One set of influencers related to the separation decision has been identified as a matter of "taste." In deriving the ACOL Model, Warner and Goldberg (1984) address non-pecuniary factors that influence Navy enlisted personnel to separate. They describe military and civilian "taste"

factors to depict an enlistee's penchant for military service and civilian life, respectively. The intent is to analyze the significance of the "taste" factors as they change over the course of an average individual's career. The ACOL Model thus attempts to measure the cost of leaving on the basis of pay, benefits, and other incentives (i.e., both non-pecuniary and pecuniary), and provide a means for comparing continued military service with working in the civilian sector. When the desire to enter civilian life outweighs the motivation for continued service, separation is likely to occur. As long as the Navy provides adequate compensation to offset the desire to enter civilian life, according to the ACOL Model, individuals will remain in service.

The ACOL Model first estimates the cost of leaving the military and the desire for civilian life from the point of retirement. Cost estimates are then discounted to present values for each preceding career interval, that is, from retirement to accession. To illustrate, one year before retirement, an individual's cost of leaving the military is based on current and expected pay and benefits. In calculating this estimate, the major portion of the cost of leaving the military is associated with expected retirement pay and benefits due to the individual's close proximity to the retirement point. This same individual, at the accession point, will have a relatively low cost of leaving

the military. Since the retirement point is at least 20 years away, the individual's expected retirement pay and benefits have minimal impact on the estimated costs. Application of the ACOL Model shows that the costs of leaving the military increase as individuals progress further into their career (Warner and Golberg, 1984).

Studies of officer resignations tend to support the view that providing adequate compensation can offset the decision of many people to separate from the military. Howell (1980), for example, looked at the reasons why mid-grade (O-2 to O-4) Surface Warfare officers decide to resign. His data were derived from post-resignation questionnaires (NAVPERS 1920/3 Rev 4-79 and NAVPERS 1920/3 rev. 1-73). The sample consisted of 281 Surface Warfare officers, between the rank of lieutenant junior grade and lieutenant commander, who resigned their commission in late 1978 to late 1980. In his study, Howell found insufficient pay was a major reason for Surface Warfare officer resignations. Moreover, his research indicates a consistent trend among separation studies that relates retention with compensation. The consensus is that increases in pay and fringe benefits are positively correlated to retention and that adequate compensation can offset the desire of an officer to enter civilian life (Howell, 1980).

Stolzenberg and Winkler (1983) conducted a study of voluntary terminations of US military service members for

the Office of the Secretary of Defense (Manpower, Installations and Logistics). The authors define voluntary termination as a "voluntary departure during an enlistment term, terminations through nonreenlistment, and resignations of officers." Their purpose is to provide an integrated review of the wide variety of military attrition and separation studies, making their results readily available for researchers and policy makers alike. Moreover, they attempt to provide new policy recommendations and to seek new approaches for examining attrition and separation issues.

Although their work is primarily related to enlisted personnel, the research provides further insight into the officer separation decision. For one, Stolzenberg and Winkler (1983) show that there are similarities between the "quit" decisions of civilian employees and those of persons in the military. That is, military and civilian compensation is not merely based on salary but other, non-pecuniary benefits. These non-pecuniary benefits entail fringe benefits and privileges. When combined with monetary benefits, members of both groups consider the total sum in their decision to leave or remain in an organization. If another organization offers higher levels of compensation, then both civilian employees and military service members tend to react in a similar and rational manner, leaving one job for another (Stolzenberg and Winkler, 1983).

## **B. CAREER MILESTONE FACTORS**

Career milestones are another set of factors that can affect the decision to separate. That is, an individual's preference for continued military service may increase or decrease depending upon his or her attainment of a career milestone. Officers, like their enlisted counterparts, tend to separate when their preference to stay is outweighed by their desire for civilian life. For Surface Warfare junior officers, still in the early phase of their career, mandatory separation may occur as a result of their inability to attain milestones such as promotion to a higher grade, selection to (or successful completion of) a department head tour, and attainment of warfare qualification. The cost of leaving the military for officers who do not achieve these career milestones is non-existent.

To illustrate, officers are eligible for promotion based on their years of commissioned service and time in grade. When officers meet requirements for the next higher grade, they will be reviewed at the next convening promotion board. If an officer fails to be selected for promotion at this (first) board, the individual must wait for the next convening promotion board (usually convening the following year). If the officer fails to be selected for promotion a second time, the individual is forced to separate.



(MILPERSMAN, 1995). As a result, faced with mandatory separation, an estimate of the cost of leaving the military for officers who twice fail to select is meaningless.

Moreover, to remain competitive as well as promotable, Surface Warfare junior officers must complete one single long department head tour (36 months in duration) or two successive 18-month department head tours. If unable to successfully complete a tour, due to performance in the billet or failure to screen for department head, the officer experiences a reduced likelihood for advancement. The end result is a lower cost of leaving the military (NAVPERS 15605).

Before a Surface Warfare junior officer can begin to become concerned with promotion and selection boards, the individual must attain warfare qualification. Only then is it possible for a junior officer to entertain aspirations of a Naval career.

The significance of SWO qualification on a career is clearly stated in The Naval Officer's Career Planning Guidebook (NAVPERS 15605):

The major milestone of a surface warfare trainee's career is to be designated as a Surface Warfare Officer (111X). From the day you are commissioned, the schools you attend, the qualifications you earn and the expertise you gain all are for one purpose: to enable you to become designated as a Surface Warfare Officer (SWO). You must qualify as a SWO in order to have a career in the Surface Navy. (NAVPERS 15605).

Surface Warfare junior officers must qualify in their field to remain in service as a Surface Warfare Officer. If they do not, the likelihood of promotion to higher grades and selection for department head becomes virtually non-existent. Consequently, as in the previous examples, the officer's cost of leaving the military also becomes non-existent: there is little choice but to separate. (NAVPERS 15605).

#### **C. PERSONAL CHARACTERISTICS**

Career milestones allow officers to gauge the vitality of their career, playing a significant role in the separation decision. No less important are factors related to personal characteristics (i.e., marital status, race, and education) and their effects on the preference for continued military service and the desire to enter civilian life.

As noted earlier, Stolzenberg and Winkler (1983) attempted to integrate separation and attrition findings. In their study, they codify pre-service (personal) characteristics and provide results for each. Summarizing these results, they indicate the following:

... the preponderance of evidence is that marriage and children tend to increase the probability of voluntary termination from military service.

Simple statistics ... do not reveal unambiguously if race is merely correlated with factors which have true effects on termination ....

Persons unsuccessful at seeing their high school studies through completion also tend to be unsuccessful at seeing their military service through to completion. (Stolzenberg and Winkler, 1983).

Further, the authors indicate that a relationship exists between these characteristics and voluntary termination by enlistees. Although the emphasis is on enlistees, other studies concerning officer separation and/or promotion studies appear to substantiate their conclusion.

Mehay (1995), for example, studied the performance of Navy and Marine Corps junior officers relating promotion, retention, and warfare qualification and the indirect effect of minority status. In the analysis, probit regressions were used to determine the likelihood of an officer's retention, promotion, and warfare qualification. The results revealed that persons who were married or had dependents, women, and Naval Academy graduates had a higher likelihood of retention (up to the O-4 board), while those with high Grade Point Averages or GPAs (above 3.2) had a lower likelihood of retention. As for race, its indirect effect was found to influence retention via a series of chronological steps emanating from early childhood and one's socioeconomic upbringing. That is, from early childhood on, one's socioeconomic status may limit the quality of education received, which may, in turn, affect future career

opportunities. Although race was found to be slightly significant, its true effect cannot be measured due to the inability to separate the effects of interrelated factors such as promotion, warfare qualification, and performance. (Mehay, 1995). Unable to isolate each effect from the other, the result is to include all into a study and analyze their indirect effects. Nevertheless, it is noted that personal characteristics (i.e., sex, race, education, and marital status) were significant determinants of retention.

In a study for the Office of Naval Research, Derr (1979) looked at career factors that may affect productivity and officer retention. As part of the study, Derr interviewed twenty-five married couples with spouses in the Navy and 135 additional Naval officers. The results suggested that a relationship exists between retention and the ability of a spouse to adjust to military life in the Early-Career Phase (O-1 and O-2 officer grades). During the Mid-Career Phase (O-3 and O-4 officer grades), an officer decides to remain in service, due to high career aspirations, or to seek retirement. Simultaneously, marital and family concerns continue to play a part in the retention decision, creating conflict between continued pay and benefits and family separation. By the Late-Career Phase (O-5 and higher officer grades), the conflict continues, with the source of conflict emanating from the ensuing change in career, civilian employment, or retirement. In

all three phases, the presence of a spouse was found to have an effect on one's decision to separate. (Derr, 1979)

It is generally agreed among labor economists that age and marital status are related to worker mobility.

Ehrenberg and Smith (1993), for example, state:

To be specific, mobility is much higher among the young and better educated -- as Human Capital Theory would suggest.

With respect to age groups, they further indicate:

... within age groups, unmarried people are more likely to migrate than married ones, and that married people without children are more mobile than those with children. (Ehrenberg and Smith, 1993).

In both cases, the authors suggest that groups, comprised of individuals who have similar personal characteristics, possess similar norms and values that influence their behavior to change jobs more often than others. In the case of Naval officers, as Derr (1979) and Mehay (1995) note this equates to officers with similar personal characteristics, such as marital status or race, to change jobs more readily than officers with dissimilar personal characteristics (Ehrenberg and Smith, 1993).

#### D. SHIP CHARACTERISTICS

Ship characteristics are categorized by either mission, class, or individual unit, and are based on an individual's first assignment.

Past studies have indicated that a relationship exists between initial ship assignment and promotion. With respect to separation, the majority of studies focus on the effects of demographic and performance factors. In these studies, effects related to ship type are of secondary importance or a nonexistent issue instead of the primary focus. Interestingly, although a secondary issue, results suggest that a relationship exists between ship type and separation.

Kear (1989) examined the relationship between ship type and first-term attrition by Navy enlistees. Data were derived from the Department of Defense (DOD) Enlisted Master Record (EMR), and files were extracted on male enlistees with 33 months or less of completed service. Analyzing three cohorts (new accessions for 1977, 1981, and 1995), a total of 77,502 personnel and 300 ships were studied. Personnel were identified with their respective ships on the basis of three formats: individual ship, ship class, and ship mission. The results revealed high attrition rates for personnel assigned to oilers and low attrition rates for those assigned to CRUDES (Kear, 1989).

Expanding on Kear's result, Bellamy (1991) studied the relationship between initial ship assignment, initial billet assignment, warfare qualifications, and officer performance. Data were derived from the Officer Master-Loss Record File, maintained by the Defense Manpower Data Center (DMDC), and the Officer Promotion History Data File provided by the Department of the Navy. The sample was comprised of Surface Warfare officers who completed their minimum service requirements and remained in the Navy up to the Lieutenant Commander Promotion Board. Although separation is not a primary focus, the results suggest that a relationship exists between ship type and performance. Findings reveal differences in qualification rates, lower likelihood of promotion to LCDR, and lower likelihood of initial assignment to CRUDES for minorities (Bellamy, 1989).

Further support is provided in a study of the performance of Navy and Marine Corps officers by Mehay (1995). The study indicates that minorities have lower GPAs than non-minorities and are less likely to be assigned to a CRUDES ship. As in Bellamy's (1989) conclusions, CRUDES assignment is found to have a significant effect on increased measured performance, and minority status is related to decreased measured performance (i.e., lower warfare qualification rates) (Mehay, 1995).

Research conducted by the Center for Naval Analyses (1995) attempted to determine the relationship between

promotion and race, college characteristics, and initial ship assignment for Naval officers. Focusing on Surface Warfare junior officers, who completed four to eleven years of service, the results indicate lower probabilities for promotion for individuals having the following characteristics:

- (1) Non-minorities
- (2) Single at accession
- (3) Non-technical majors
- (4) Non-prior service OCS accession
- (5) Prior-service NROTC accession
- (6) Average College GPAs (2.2 to 3.2)

Further, the study describes its observation on African-American and CRUDES assignment as follows:

Although only 39 percent of African-Americans, as opposed to 54 percent of Caucasians, serve on CRUDES, relatively more African-Americans are on amphibs or carriers. Therefore, the net effect of ship class on racial differences in promotion rates is small. (Koopman, Board, and Reese, 1995)

Although the study suggests that race has a small net effect on promotion, it is crucial to note the percentage differences between African-Americans and Caucasians serving on a CRUDES ship. Failure to account for these differences



could bias the relationship between separation and ship type. Therefore, inclusion of an interactive variable becomes necessary to adequately isolate ship type effects and account for bias. (Koopman, Board, and Reese, 1995)

#### **E. SUMMARY**

In summary, if an organization cannot provide adequate compensation to meet the needs of its members, then individuals will seek other employment. For Naval officers, seeking other employment revolves around the decision to separate or enter the civilian labor market (i.e., "taste" factors). This is further affected by personal elements or considerations (i.e., marital status) and job-related factors, such as ship characteristics, which can influence the ability of an officer to achieve career milestones. Consequently, if a consistent trend of officers who were assigned to similar ships separate due to non-attainment of career milestones, then it is possible that factors common to that type of ship may have been an underlying reason for separation.

### **III. METHODOLOGY**

This study uses frequency and logit analyses to determine the separation trends of Surface Warfare officers as well as the common characteristics of leavers and significant explanatory variables for separation. The study basically addresses the following questions: Does ship type affect the separation decision of a Surface Warfare junior officer? Simply put does ship type make a difference? If the answer to this question shows that ship type makes a difference, the issue is further expanded to identifying the characteristics of Surface Warfare officers who separated.

#### **A. OVERVIEW**

The study follows methods used in previous studies, makes comparisons of the results, then adjusts current methods to build upon them. Officer separation trends are obtained following Kear's (1989) use of frequency analysis on enlisted attrition. Significant determinants of separation are then extracted using techniques similar to studies of minority officer performance (Mehay, 1995; Bellamy, 1991). After making comparisons, additional factors for ship characteristics and separation groups are included to determine their subsequent effects.

The key elements in the analysis pertain to the identification of Surface Warfare junior officer separation trends and the determination of factors influencing their decision to separate as they relate to ship type. If the relationship between ship type and separation is significant, then the next step is to describe common characteristics of separators and to seek an explanation for the findings.

## **B. DATA**

The data were organized into two data sets. The first data set was developed by the Center for Naval Analyses (CNA) from the Navy's Officer Master Tapes (OMT) and permits a historical overview of a Surface Warfare junior officer's career. CNA's data are comprised of Surface Warfare officers who entered service from 1976 to 1990 and are limited to Lieutenant Commanders and below, non-nuclear power officers, and officers following standard advancement progressions. These data are then used to identify separation trends, create three groups based on an individual's years of service, and analyze similarities exhibited by separators between groups. The second data set was developed by William R. Bowman, Professor of Economics at the United States Naval Academy, and incorporates information from the Officer Promotion History Data Files. Bowman's data are comprised of all Navy officers screened

for Lieutenant Commander from 1986 to 1994. These data are used to identify separation trends based on ship characteristics.

The data were restricted in the study to create a homogenous sample for analysis. To capture the effect of ship type as it pertains to separation, files with missing values were deleted, and restrictions were imposed to describe a Surface Warfare junior officer -- that is, a young, newly-commissioned Ensign, recently out of college (through the United States Naval Academy [USNA], Naval Reserve Officer Training Corps [NROTC], or Officer Candidate School [OCS]), with minimum prior service. Officers who possess substantial enlisted service were purposefully omitted to prevent biasing the sample. Based on Human Capital Theory, the added time of enlisted service in the Navy leads to an increased tendency to continue service (Ehrenberg and Smith, 1993). Thus, the inclusion of prior-service persons may bias the analysis and nullify its conclusions.

The first data set contained 8,260 officers and was divided into four ship characteristics related to primary mission and three career phases of separation. The career phases were created for the purpose of identifying common characteristics exhibited by group members. These phases are based on years of service and described as follows:

- (1) Termer: career phase between accession and minimum service requirement (USNA, NROTC, and OCS have 5, 4, and 3 year minimum service requirements (MSRs), respectively).
- (2) Doubter: career phase after MSR and before Lieutenant Commander (LCDR) Promotion Board.
- (3) Career: career phase up to and after the LCDR Promotion Board.

The second data set focused on officers categorized in the CAREER phase and contained 2,125 records. The CAREER phase limitation was a result of prior restrictions that omit all officers who separate before the LCDR Promotion Board. Consequently, remaining records describe only CAREER phase officers. The purpose for inclusion of the second data set into the analysis is to examine additional ship characteristics, related to ship class and individual unit, and career milestone characteristics, related to promotion and performance.

#### **C. VARIABLE EXPLANATION**

Appendix A contains detailed descriptions of variables used in the study. This section provides a brief overview of these variables.

##### **1. Dependent Variable - "Taste" Factors**

Actual behavior is used to define "taste" factors, since it is not possible to interview every officer in the sample on their preference for military service over

civilian life. That is, if an individual separates, it is assumed that the preference for military service was less than the desire for civilian life. An arbitrary limit, based on the LCDR Promotion Board, is imposed to identify separators. The study defines separators (SEP) as individuals who leave Naval service on or before their initial screening for LCDR. In terms of years of service, this correlates to individuals with less than nine total years in the Navy (NAVPERS 15605).

## **2. Independent Variables**

### **a. *Personal Characteristics***

Variables describing personal characteristics are entered into the analysis. Included here are age, race, and marital status. Also included are education variables related to college performance as measured by grade point average (GPA). Education is further expanded upon by graduate education and accession source.

(1) Age. The age (AGE) variable is based on the age of an officer at accession.

(2) Race. Race variables are classified into three categories: white (WHITE), black (BLACK), and other (OTHER).

(3) Marital Status. Marital status variables are classified into three categories: married at

accession (MRRD\_ACC), married as a Lieutenant (MRRD\_3), and married at accession but single as a Lieutenant (DIVD).

(4) Education. Education variables are categorized by GPA, graduate education, and accession source. Three GPA variables are defined by college undergraduate performance, and a graduate education (MSTR) variable denotes attainment of a graduate degree. Accession source variables are based on three sources: USNA, NROTC, and OCS. Enlisted commissioning sources are purposefully omitted to create a homogeneous sample of the study's focus group.

***b. Career Milestones***

Career milestone variables are related to promotion, warfare qualification, and department head selection. Additional performance measures are included in the analysis of the second data set (developed by Bowman), based on fitness report (FitRep) inputs. Whether or not individuals were recommended for accelerated promotion (RAP), individuals are divided into categories denoting their performance status in comparison with others.

***c. Ship Characteristics***

In creating a ship type variable, the analysis requires that ship type be defined in three formats: UNIT, CLASS, and TYPE. UNIT describes individual commands; CLASS combines units by their mission; and TYPE

combines classes into ship types. For example, the CHARLES F ADAMS (DDG-2) is one command, UNIT. It is also categorized as a destroyer, CLASS. When combined with cruiser and frigate classes, the CHARLES F. ADAMS falls into a larger group, CRUDES.

With respect to the data set developed by CNA, ship characteristics are limited to TYPE variables due to limitations imposed by the original data files. UNIT, CLASS, and TYPE variables are used in the second data set, derived from Bowman's files, and are incorporated in the analysis of performance measures (i.e., RAP FitReps) and the identification of separation trends by UNIT and CLASS.

Direct comparisons between results from the first and second data sets were not feasible, since their respective samples consisted of different officers. However, similarities in separation trends between the two samples provided further evidence that ship type and Surface Warfare officer separation may be related.

#### *d. Interactive Variable*

An interactive variable is included in the logit analyses to examine the effects of ship type and race. As indicated by Koopman, Board, and Reese (1995), the high number of African-American officers assigned to amphibious (AMPHIB) ships may bias results. That is, if the variables "minority group" and AMPHIBS are highly correlated and both



are significant determinants of separation, then it is unlikely that the true effect each may have on separation can be observed. Consequently, the results could be misleading.

To avoid this, the study combines variables for AMPHIB and minorities (MINOR) to create an interactive variable (AMP\_MIN). If results reveal AMPHIBS, MINOR, and AMP\_MIN are significant, then amphibious duty and race are significant. However, if the same regression is run and MINOR is not significant, then race is no longer a significant determinant. As a result, the effect of amphibious ships on separation is observed despite its high correlation with race.

#### **IV. ANALYSIS**

This chapter uses descriptive statistics to examine factors that may have an effect on Surface Warfare junior officer separation. Separation rates are calculated for each ship type by career phase, personal characteristics and career milestones, and a logit model is used to determine common characteristics of leavers. Additionally, an exploratory analysis is conducted to examine the effect of a performance measure (recommendation for accelerated promotion [RAP]), the effect of an interactive variable related to race and ship type, and the likelihood of SWO qualification and initial ship assignment.

##### **A. DESCRIPTIVE STATISTICS**

Frequencies and percentages of the explanatory variables were calculated to describe the sample. The results are provided in Appendix B, Table 1.

##### **1. Sample Composition**

The following is a brief summary of the composition of the sample:

- About 80 percent of the Surface Warfare junior officers in the sample were 24 years old or younger.
- The proportion of married officers increased 25 percentage points from accession to lieutenant.

- The majority of officers are Caucasian, and 47 percent of minorities are African-American.
- Twenty percent of officers earned graduate degrees, 74 percent earned average GPAs (3.2 to 2.2), 18 percent earned high GPAs (greater than 3.2), and 8 percent earned GPAs less than 2.2.
- Fifty-one percent received commissions through Officer Candidate School (OCS); the remainder were Naval Reserve Officer Training Corps (NROTC) and Naval Academy graduates.
- Ninety-three percent of the officers attained the ranks of Lieutenant and Lieutenant Junior Grade within 49 and 24 months of accession, respectively.
- Thirty-seven percent screened for Department Head. About 30 percent changed designator, and 78 percent earned their qualifications for Surface Warfare Officer (SWO).
- About 58 percent of officers served initially onboard a CRUDES ship, followed by AMPHIB, CARRIER, and CLF, in descending order.

## 2. **Expectations**

Expectations for the likelihood of officers to separate are provided below and are based on the descriptive statistics from the preceding section.

### *a. Age at Accession*

Since younger workers have greater job mobility than older workers, it is expected that the majority of leavers were relatively young at the time of commissioning (Ehrenberg and Smith, 1993).

**b. Marital Status**

Marital status is expected to be a significant factor for separation. This expectation is based primarily on Derr's (1989) findings on the significance of a spouse in a Naval officer's career, which suggests marital status negatively affects separation in the early years.

**c. Race**

Since minority status is divided into two mutually exclusive variables, BLACK and OTHER, separation behavior between both groups is not expected to mirror one another. However, indirect effects of race on performance may exert their influence equally in both minority groups (Mehay, 1995). That is, relatively higher separation rates may hold true for both minority sub-categories when compared with Caucasians.

**d. Graduate Education**

Although graduate education may increase the likelihood of separation, two factors reduce its effect on separation. One factor relates to the limited off-duty time inherent with sea duty. If officers are unable to attend school in conjunction with their military duties, they may wait later in their career to pursue an advanced degree. The other factor pertains to additional service obligations. Officers who elect to earn an advanced degree, either

Navy-sponsored or subsidized, incur an additional service obligation. In the case of the Naval Postgraduate School, this equates to two years additional obligation for the first year of education. Afterwards, the obligation is calculated on a month-to-month payback. (MILPERSMAN, 1995). In both instances, the effects of graduate education on separation may prove insignificant.

*e. College GPA*

With respect to college GPA, separation rates among officers with lower GPAs are likely to parallel separation rates among officers assigned to less-coveted ship types, since initial assignment is based primarily on GPA. (Mehay, 1989).

*f. Accession Source*

Although a large proportion of the sample received their commission via OCS, it is expected that Naval Academy graduates will have a higher likelihood to continue Naval service. Competing for an appointment to the Naval Academy and enduring a military regimen throughout undergraduate studies suggests that midshipmen have a higher propensity for military service than NROTC and OCS accessions.

**g. Career Milestones**

It is expected that officers who do not attain career milestones will eventually separate. If a trend of non-attainment of career milestones occurs among officers within the same ship type, one may speculate that there is a connection between ship type and separation.

**h. Ship TYPE**

It is uncertain how large a role ship type plays in the separation decision. However, if separation rates between ship types vary substantially, then further analysis into the relationship between separation and ship type is warranted.

**B. SEPARATION RATES**

**1. Ship Characteristics: TYPE, CLASS, UNIT**

In analyzing the separation rates between ship TYPE, CLASS, and UNIT, the data reveal differences throughout all categories. Although these findings are inconclusive, the disparity of the separation rates provides further support to seek underlying causes attributed to ship type.

**a. CNA Data Set**

The first data set (provided by CNA) dealt primarily with separation rates of officers who successfully completed minimum service requirements. (Limitations imposed

by CNA permitted analysis of ship type only.) The results are provided in Table 2.

As seen in Table 2, differences in separation rates are quite clear. The CARRIER separation rate (53.0 percent) is between 14 to 11 percentage points higher than that of other ship types. The next highest separation rate (41.6 percent) is among CLF officers, with CRUDES exhibiting the lowest rate (39.0 percent ). Thus, CLF and CARRIER separation rates are higher than the sample's mean separation rate (40.2 percent). Conversely, CRUDES and AMPHIB separation rates are lower than the mean.

Table 2. Separation Rates and Number of Surface Warfare Junior Officers Who Separated (Leavers) by Initial Ship Assignment (TYPE), 1976-1990

Junior Officers	CRUDES Freq (%)	AMPHIB Freq (%)	CARRIER Freq (%)	CLF Freq (%)
Leavers	1,880 (39.0)	667 (39.3)	469 <u>(53.0)</u>	308 (41.6)
Stayers	2,944 (61.0)	1,031 (60.7)	529 (47.0)	432 (58.4)
Total	4,824 (100.0)	1,698 (100.0)	998 (100.0)	740 (100.0)

Source: Derived from data provided by the Center for Naval Analyses.

Note: Separation rate is (Number of Leavers)/(Total).

#### ***b. Bowman Data Set***

The second data set (provided by Bowman) included separation rates for officers who remained in the Navy up to the LCDR Promotion Board. Separation rates for each ship TYPE as well as ship CLASS and UNIT are examined.

(1) Ship TYPE. Variation in the separation rates among ship types (TYPE) occurred as seen in the CNA results. These results are provided in Table 3. The CARRIER separation rate is again the highest among four ship types, and the CRUDES separation rate is the lowest, with AMPHIB and CLF separation rates in the middle.

Table 3. Separation Rates and Number of Surface Warfare Junior Officers Who Remained in the Navy up to or past the 0-4 Promotion Board and Separated (Leavers) by Initial Ship Assignment (TYPE), 1986-1994

Junior Officers	CRUDES Freq (%)	AMPHIB Freq (%)	CARRIER Freq (%)	CLF Freq (%)
Leavers	354 (25.9)	102 (31.3)	85 (40.5)	73 (32.9)
Stayers	1,013 (74.1)	224 (68.7)	125 (59.5)	149 (67.1)
Total	1,367 (100.0)	326 (100.0)	210 (100.0)	222 (100.0)

Source: Derived from data provided by William Bowman, Department of Economics, U.S. Naval Academy.

Note: Separation rate is (Number of Leavers)/(Total).

(2) Ship CLASS. With respect to ship CLASS, the data further reveal differences in separation rates between conventional and nuclear-powered ships. Officers assigned to conventional aircraft carriers have higher separation rates than officers assigned to nuclear-powered aircraft carriers, 40.5 and 37.0 percent, respectively (restricted to officers without nuclear power sub-specialty).

The same holds true for the relationship between conventional and nuclear-powered cruisers: officers



assigned to nuclear-powered cruisers have a 19 percent separation rate, compared with a rate of 32 percent for those assigned to conventional cruisers.

An explanation for this may be related to less watchstation competition onboard nuclear-powered ships. Since officers in the nuclear sub-specialty must first qualify as engineering officers before beginning the surface warfare qualification process, there is less competition to qualify for watchstations among officers who are not in the nuclear sub-specialty and are assigned to nuclear-powered ships than among their counterparts onboard conventional ships.

(3) Ship UNIT. Comparisons between individual ships (UNITs) reveal many officers have separated prior to the LCDR Promotion Board. Nevertheless, the results indicate that differences in separation rates were not limited to ship TYPE and CLASS. Varying degrees in officer separation rates continued to occur between ship UNITs, with separation rates as high as 100 percent in some instances.

In examining the UNIT separation rates, arbitrary restrictions were imposed to seek separation trends between ships despite the low numbers of officers still in the Navy for a given ship.

If three or more officers who were initially

assigned to a ship stayed in the Navy at least to the LCDR Promotion Board, then the separation rate of the ship unit was calculated. Ships with 50 percent or greater separation rates were identified, and the results are provided in Appendix B, Table 2.

## **2. Career Phases**

Three career phases were defined in the analysis: TERMER, DOUBTER, and CAREER. The TERMER phase denotes the time period from accession to minimum service requirement (MSR). The DOUBTER phase indicates the time period after MSR but before the LCDR Promotion Board. The CAREER phase includes the time period from LCDR Promotion Board to 12 years time in service. Table 4 provides separation rates for Surface Warfare junior officers by ship type and career phase.

Table 4. Separation Rates and Number of Surface Warfare Junior Officers Who Separated (Leavers) by Initial Ship Assignment (TYPE) and Career Phase, 1976-1990

Phase	CRUDES	AMPHIB	CARRIER	CLF
	Freq (%)	Freq (%)	Freq (%)	Freq (%)
Termer Leavers (1 - MSR)	394 ( 8.2)	113 ( 6.7)	98 ( 9.8)	69 ( 9.3)
Doubter Leavers (MSR - 04 Board)	1,091 (22.6)	396 (23.3)	294 (29.5)	171 (23.4)
Career Leavers (04 Board -)	395 ( 8.2)	158 (10.8)	77 ( 7.7)	68 ( 9.2)
All Leavers	1,880 (39.0)	667 (39.3)	469 (53.0)	308 (41.6)
Total	4,824 (100.0)	1,698 (100.0)	998 (100.0)	740 (100.0)

Source: Derived from data provided by the Center for Naval Analyses.

Note: Separation rate is (Number of Leavers)/(Total).

#### a. Trends

The results reveal separation trends occurred in all three career phases, indicating ship type and Surface Warfare junior officer separation may be more than coincidental. For instance, since the CARRIER separation rate is highest in the TERMER phase, initial assignment to an aircraft carrier may not be conducive to retention. Moreover, separation rates among officers assigned to an aircraft carrier continued to remain the highest in the DOUBTER phase, despite a significant increase in separation rates across all ship types.

Even more interesting, perhaps, is the increase in separation rates among officers assigned

initially to an amphibious ship. Looking only at the TERMER and CAREER phases, the AMPHIB separation rate increased four percentage points; all other separation rates increased slightly ( less than .01 percent) or decreased.

**b. Causes**

Possible causes of these separation trends may be related to warfare qualifications and shipboard experience. Qualifications and knowledge gained while assigned to an aircraft carrier or an amphibious ship may not readily translate to other ships such as cruisers and destroyers. Officers who fail to make the transition from one ship type to another ship type may subsequently fall behind their peer groups.

Additionally, the relatively high separation rate for officers in the "Doubter" phase may also stem from personal and ship characteristics not exerting their influence until later in one's career. For example, additional warfare qualifications not obtained during one's initial sea tour may decrease competitiveness and advancement opportunities during the LCDR Promotion Board. As such, separation tendencies may increase among those affected as they near eligibility for promotion.

**3. Age**

Table 5 shows the average ages (at time of commissioning) of Surface Warfare junior officers who

separated from service by career phase and ship type.

**a. Trends**

Separation trends based on age at accession indicate officers who separated early in their career ("Termer" phase) were younger than officers who separated later ("Doubter" or "Career" phases).

With respect to ship types, it appears that CRUDES and CARRIER officers separated at a younger age than AMPHIB and CLF officers. Although the differences between their average ages are small, it is important to note that this observation consistently appears across all career phases.

**b. Causes**

An explanation for younger officers separating more readily in the "Termer" phase than older officers is based largely on younger individuals having greater occupational mobility than their older counterparts. (Ehrenberg and Smith. 1993).

As for the apparent age difference between CRUDES and CARRIER officers versus AMPHIB and CLF officers, this may be largely due to the possibility that officers assigned to AMPHIB and CLF ships were generally older than their counterparts onboard other ships as the average age for their respective groups suggested.

Table 5. Average Age (in years) at Time of Commissioning of Surface Warfare Junior Officers Who Separated (Leavers) by Initial Ship Assignment (TYPE) and Career Phase, 1976-1990

Phase	CRUDES Mean Age	AMPHIB Mean Age	CARRIER Mean Age	CLF Mean Age
Termer Leavers (1 - MSR)	22.01	<u>22.27</u>	21.94	<u>22.14</u>
Doubter Leavers (MSR - 04 Board)	23.36	<u>24.01</u>	23.58	<u>24.05</u>
Career Leavers (04 Board -)	24.61	<u>25.13</u>	25.10	<u>25.66</u>
All Leavers	23.58	23.99	23.51	24.03
Total Sample	23.55	24.12	23.82	24.19

Source: Derived from data provided by the Center for Naval Analyses.

#### 4. Race

Table 6 shows separation rates for Surface Warfare junior officers by race and ship type.

##### a. Trends

No apparent separation trend is revealed relating ship type with race. Each race category indicates varying degrees of separation rates between ship types, with no consistent trend of high or low separation rates for a particular ship type across all races.

The results reveal that white and black officers have the highest separation rates within their respective races when initially assigned to an aircraft

carrier; the remaining officers in the OTHER category had the highest separation rates from those assigned to amphibious ships.

**b. Causes**

Since each race exhibited different separation tendencies across all ship types, it is not possible to single out one particular ship type as it affects separation. However, the expectation that the two mutually exclusive minority categories may not exhibit similar tendencies hold true.

Although a separate issue, it is important to note that the different separation rates between races appear to support Mehay's (1995) findings which related the indirect effects of race with separation. Table 6 reveals minorities who were initially assigned to an amphibious ship have higher separation rates than non-minorities who were initially assigned to a cruiser/destroyer or an amphibious ship.

Table 6. Separation Rates of Surface Warfare Junior Officers Who Separated by Race and Initial Ship Assignment (TYPE), 1976-1990

	CRUDES Freq (%)	AMPHIB Freq (%)	CARRIER Freq (%)	CLF Freq (%)
<b>WHITE</b>				
Leavers	1,696 (39.1)	557 (38.5)	397 (48.1)	258 (42.4)
Total	4,338 (100.0)	1,448 (100.0)	826 (100.0)	608 (100.0)
<b>BLACK</b>				
Leavers	70 (34.5)	56 (42.4)	45 (45.0)	27 (40.3)
Total	203 (100.0)	132 (100.0)	100 (100.0)	67 (100.0)
<b>OTHER</b>				
Leavers	114 (40.3)	54 (45.8)	27 (37.5)	23 (35.4)
Total	283 (100.0)	118 (100.0)	72 (100.0)	65 (100.0)

Source: Derived from data provided by the Center for Naval Analyses.

Note: Separation rate is (Number of Leavers)/(Total).

## 5. Marital Status

Table 7 provides separation rates for Surface Warfare junior officers by marital status at the time of commissioning and ship type.

### a. Trends

With one exception, officers who were married when commissioned appeared less likely to separate from the Navy than officers who were single. The data reveal separation rates for married officers are less than separation rates for single officers in three of four ship types. The exception occurred among officers who were initially assigned to an amphibious ship. In this case, single officers tend to separate at a lower rate than married officers.



Moreover, differences in the separation rates between ship types continued to occur. Married officers who were initially assigned to an amphibious ship or an aircraft carrier have higher separation rates (about 7 percentage points) than their married counterparts assigned to cruiser/destroyer and combat logistics force (CLF) ships. For single officers, those assigned to cruiser/destroyer or amphibious ships have lower separation rates than their counterparts assigned to aircraft carriers and CLF ships.

The CRUDES separation rates for single and married officers are either lowest (40 percent for single officers) or less than 1 percentage point from being the lowest (about 34 percent for married officers) as compared with other ship types.

**b. Causes**

It is uncertain as to why these trends occurred. However, speculation based on operational characteristics (not accounted for in the original data set) associated with ship types may provide some insight into the findings.

A carrier battle group (CBG) is usually comprised of cruiser/destroyer, aircraft carriers, and combat logistics force ships (CLFs). Whereas, an amphibious readiness group (ARG) is largely made up of amphibious ships, with a few CLF ships. Since married officers who

were assigned to typical CBG ships separated at a lower rate than their single counterparts, operations associated with CBGs appear to be less taxing for married officers than for single officers. In the case of operations associated with ARGs, the reverse occurs, with single officers separating at a lower rate than married officers. It should be noted that there is a limitation in the analysis of separation by ship type and marital status. The marital status variable identifies whether an officer was married or single at the time of commissioning. The officer's marital status may very well have changed by the time the officer separated -- some officers may have married, some may have divorced, while some may even have married, divorced, and remarried by the time of their separation.

Table 7. Separation Rates of Surface Warfare Junior Officers Who Separated (Leavers) by Marital Status at Accession and Initial Ship Assignment (TYPE), 1976-1990

Marital Status	CRUDES Freq (%)	AMPHIB Freq (%)	CARRIER Freq (%)	CLF Freq (%)
<b>MARRIED</b>				
Leavers	267 (33.7)	139 (40.8)	58 (39.5)	40 (33.3)
Total	793 (100.0)	341 (100.0)	147 (100.0)	120 (100.0)
<b>SINGLE</b>				
Leavers	1,613 (40.0)	528 (38.9)	411 (51.7)	268 (43.2)
Total	4,031 (100.0)	1,357 (100.0)	851 (100.0)	620 (100.0)

Source: Derived from data provided by the Center for Naval Analyses.

Note: Separation rate is (Number of Leavers)/(Total).

## 6. Graduate Education

Table 8 shows separation rates for Surface Warfare junior officers who had graduate degrees by career phase and ship type.

### a. Trends

Officers who earned a graduate degree tended to remain in service. Less than 20 percent who earned a graduate degree separated.

Officers who did separate appeared to separate later in their Naval career. Separation rates for officers who earned a graduate degree are lower in the early phases ("Termer" and "Doubter"), increasing to a relatively higher rate in the "Career" phase. Less than 1 percent separation rates are observed throughout all ship types in the "Termer" phase. Afterwards, rates steadily increase, with CLF officers who earned graduate education exhibiting the highest separation rate (17.7 percent) in the "Career" phase.

More importantly, non-CRUDES officers who possessed a graduate degree tend to separate at a higher rate than their contemporaries who were initially assigned to a cruiser/destroyer. Non-CRUDES officers separated at a rate between two and four percentage points higher than CRUDES officers who separated at the lowest rate overall (16.2 percent).

**b. Causes**

Due to limited off-duty time and additional service obligations, the effects of graduate education on separation were expected to have minimal impact early in a Naval officer's career, as discussed in Section A of this chapter. Moreover, lower separation rates among officers with graduate education were expected to occur based on the substantial amount of time these officers will have invested in the Navy by the time they satisfy additional service obligations.

As for differences between non-CRUDES and CRUDES separation rates, the lower separation rates among CRUDES officers who earned graduate education may be related to transferable experience and qualifications, also addressed in Section A of this chapter.

Table 8. Separation Rates and Number of Surface Warfare Junior Officers Who Earned Graduate Degrees and Separated (Leavers) by Initial Ship Assignment (TYPE) and Career Phase, 1976-1990

Career Phase	CRUDES Freq (%)	AMPHIB Freq (%)	CARRIER Freq (%)	CLF Freq (%)
TERMER <sub>(1 - MSR)</sub> Leavers	7 (<0.2)	1 (<0.1)	1 (<0.1)	0 ( 0.0)
DOUBTER <sub>(MSR - 04 Board)</sub> Leavers	49 ( 4.3)	16 ( 5.0)	11 ( 8.2)	4 ( 3.1)
CAREER <sub>(04 Board -)</sub> Leavers	128 (11.3)	41 (12.9)	18 (13.5)	23 (17.7)
ALL Leavers	184 (16.2)	58 (18.2)	30 (22.6)	27 (20.8)
Total	1,137(100.0)	318(100.0)	133(100.0)	130(100.0)

Source: Derived from data provided by the Center for Naval Analyses.

Note: Separation rate is (Number of Leavers)/(Total).

## 7. College Grade Point Average

Table 9 shows the separation rates of Surface Warfare junior officers by ship type and college grade point average (GPA). With one exception, the results appear to substantiate the expectation that officers with high GPAs would have different separation rates than those with low GPAs, since GPA is a major prerequisite for initial assignment.

Table 9. Separation Rates of Surface Warfare Junior Officers Who Separated by College GPA and Initial Ship Assignment (TYPE), 1976-1990

College GPA	CRUDES Freq (%)	AMPHIB Freq (%)	CARRIER Freq (%)	CLF Freq (%)
<b>High GPAs</b>				
Leavers	439 (42.8)	89 (46.4)	107 (52.2)	39 (45.4)
Total	1,025 (100.0)	192 (100.0)	205 (100.0)	86 (100.0)
<b>Average GPAs</b>				
Leavers	1,344 (38.0)	502 (38.8)	320 (45.2)	240 (41.8)
Total	3,534 (100.0)	1,295 (100.0)	708 (100.0)	574 (100.0)
<b>Low GPAs</b>				
Leavers	97 (36.6)	76 (36.0)	42 (49.4)	29 (36.3)
Total	265 (100.0)	211 (100.0)	85 (100.0)	80 (100.0)

Source: Derived from data provided by the Center for Naval Analyses.

Note: Separation rate is (Number of Leavers)/(Total).

**a. Trends**

Officers with a high GPA (greater than 3.2) appear to separate more readily when compared with officers who have average or low GPAs. Moreover, officers in all GPA categories tend to separate at the highest rate when initially assigned to an aircraft carrier.

The results reveal that officers with a relatively high GPA (greater than 3.2) have the highest separation rates across all ship types when compared with officers who have average or low GPAs. Additionally, with the exception of aircraft carriers, individuals with a low GPA (less than 2.2) have the lowest separation rates.

As for officers who were initially assigned to an aircraft carrier, separation rates for each GPA category are at their highest, varying between three and

thirteen percentage points higher than the next highest separation rate for their category.

**b. Causes**

Possible causes for these trends may be related to perceptions of increased opportunity or pay and benefits in the civilian sector. Officers with a high GPA may be more attracted to incentives offered by civilian employers than officers with average or low GPAs.

As for the relatively "equal" separation rate for officers who were initially assigned to an aircraft carrier, an explanation based on GPA alone cannot be given. However, since GPA was not an issue for CARRIER officers, the reason for their higher separation rates may be related to other factors.

**8. Accession Source**

Table 10 shows separation rates for Surface Warfare junior officers by accession source and ship type.

**a. Trends**

With the exception of initial assignment to an aircraft carrier, Naval Academy graduates appear to have a higher propensity for staying in the Navy. At the same time, NROTC graduates exhibit a lower propensity for staying in the Navy than either Naval Academy or OCS graduates.

Naval Academy graduates maintain relatively low separation rates except for those who were initially

assigned to an aircraft carrier. In this case, they not only have the highest separation rate compared with other Naval Academy graduates, but also the highest overall percentage of leavers.

As for other accession sources, NROTC graduates separated at higher rates than either Naval Academy or OCS graduates. OCS graduates remained relatively in the middle with respect to separation rates across all ship types.

**b. Causes**

The expectation that Naval Academy graduates would have a higher propensity for staying in the Navy appears to hold true with the exception of those who were initially assigned to an aircraft carrier.

As for an explanation for NROTC and OCS separation trends, OCS graduates, like Naval Academy graduates, may also possess a high propensity to remain in the Navy. It is possible that OCS graduates, having worked in the civilian sector, entered the Navy because civilian employment no longer appealed to them. As such, their propensity to stay in the Navy may be higher than NROTC graduates who enter directly out of college with relatively low or non-existent occupational experience in the civilian sector.



Table 10. Separation Rates of Surface Warfare Junior Officers Who Separated (Leavers) by Accession Source and Initial Ship Assignment (TYPE), 1976-1990

Accession Source	CRUDES Freq (%)	AMPHIB Freq (%)	CARRIER Freq (%)	CLF Freq (%)
<b>USNA</b>				
Leavers	466 (37.6)	104 (35.2)	77 (59.7)	35 (33.3)
Total	1,239 (100.0)	295 (100.0)	129 (100.0)	105 (100.0)
<b>OCS</b>				
Leavers	921 (39.0)	382 (39.3)	261 (42.4)	185 (43.7)
Total	2,361 (100.0)	971 (100.0)	615 (100.0)	423 (100.0)
<b>ROTC</b>				
Leavers	493 (40.3)	181 (41.9)	131 (51.6)	88 (41.6)
Total	1,224 (100.0)	432 (100.0)	254 (100.0)	212 (100.0)

Source: Derived from data provided by the Center for Naval Analyses.

Note: Separation rate is (Number of Leavers)/(Total).

## 9. Career Milestones

As addressed above, the attainment of career milestones can affect one's taste for the military. If an officer is unable to achieve a career milestone, separation becomes highly probable. Consequently, initial review of the data reveal trends that appear to oppose as well as support this expectation.

### a. Trends

Three separation trends related to career milestones were identified. Two of the separation trends appear to oppose the above expectation. The third trend supports it. First, CLF and CARRIER officers tend to separate at a higher rate compared with CRUDES and AMPHIB

officers, despite the successful attainment of similar career milestones. Second, CLF and CARRIER officers appear to benefit less from the attainment of career milestones, compared with officers who were initially assigned to a different ship type. Finally, CARRIER officers are failing to attain career milestones in the same proportion as their peers onboard other ships.

Table 11 shows separation rates for Surface Warfare junior officers who successfully attain career milestones by ship type. The data reveal that the separation rate for officers assigned to CARRIER and CLF are higher than those of officers assigned to CRUDES and CLF. Despite having attained similar career milestones, the differences in separation rates consistently occur across all career milestones.

Table 11. Separation Rates of Surface Warfare Junior Officers Who Separated (Leavers) by Career Milestones and Initial Ship Assignment (TYPE), 1976-1990

Career Milestone	CRUDES Freq (%)	AMPHIB Freq (%)	CARRIER Freq (%)	CLF Freq (%)
<b>SWO Qualified</b>				
Leavers	1,473 (36.9)	505 (37.6)	235 (41.3)	235 (41.5)
Total	3,992 (100.0)	1,345 (100.0)	569 (100.0)	567 (100.0)
<b>Department Head Screened</b>				
Leavers	539 (29.8)	207 (31.9)	97 (32.6)	89 (33.5)
Total	1,806 (100.0)	650 (100.0)	298 (100.0)	266 (100.0)
<b>Promoted<sub>to Lt and LTjg in 49 &amp; 24 mos</sub></b>				
Leavers	1,747 (39.0)	620 (39.2)	417 (46.5)	293 (42.8)
Total	4,478 (100.0)	1,582 (100.0)	897 (100.0)	684
<b>Promoted<sub>to LCDR</sub></b>				
Leavers	243 (16.1)	85 (17.8)	41 (22.9)	37 (22.2)
Total	1,506 (100.0)	477 (100.0)	179 (100.0)	167 (100.0)
<b>Entire Sample</b>				
Leavers	1,880 (39.0)	667 (39.3)	469 (53.0)	308 (41.7)
Total	4,824 (100.0)	1,698 (100.0)	998 (100.0)	740 (100.0)

Source: Derived from data provided by the Center for Naval Analyses.

Note: Separation rate is (Number of Leavers)/(Total).

As seen in Table 12, a comparison of Surface Warfare junior officers reveals that CLF and CARRIER officers may benefit less from the attainment of career milestones than their peers onboard other ship types. Assuming that Surface Warfare junior officers must attain career milestones to promote to LCDR, a relatively high proportion of CLF and CARRIER officers who were promoted to LCDR separated as compared with CRUDES and AMPHIB officers.

The data reveal 22 and 23 percent of CLF and CARRIER officers who separated (leavers), respectively, were promoted to LCDR. At the same time, about 12 percent of CRUDES and AMPHIB leavers were promoted to LCDR. As such, it is possible that CLF and CARRIER officers who separated as LCDRs benefited less from the attainment of career milestones than officers initially assigned elsewhere.

Table 12. Comparison of the Proportion of Surface Warfare Junior Officers Who Separated (Leavers) and Achieved or Failed to Attain a Career Milestone by Career Milestone and Initial Ship Assignment (TYPE), 1976-1990

Career Milestone	CRUDES Freq (%)	AMPHIB Freq (%)	CARRIER Freq (%)	CLF Freq (%)
<b>SWO Qualified</b>				
YES	1,473 (78.4)	505 (75.7)	235 (50.1)	235 (76.3)
NO	407 (22.6)	162 (24.3)	234 (49.9)	(23.7)
<b>Department Head Screened</b>				
YES	539 (28.7)	207 (31.9)	97 (20.7)	89 (28.9)
NO	1,341 (71.3)	460 (68.1)	372 (79.3)	219 (71.1)
<b>Promoted<sup>to LT and LTjg in 49 &amp; 24 mos</sup></b>				
YES	1,747 (92.9)	620 (92.3)	417 (88.9)	293 (95.1)
NO	133 (7.1)	47 (7.7)	52 (11.1)	15 (4.9)
<b>Promoted to LCDR</b>				
YES	243 (12.9)	85 (12.7)	41 (22.9)	37 (22.2)
NO	1,637 (97.1)	582 (87.3)	428 (77.1)	271 (77.8)
All Leavers	1,880 (39.0)	667 (39.3)	469 (53.0)	308 (41.7)

Source: Derived from data provided by the Center for Naval Analyses.

Note: Proportions are based on

(Number per Category)/(All Leavers per Category).

Shifting focus from leavers to the entire sample, Table 13 shows the proportion of officers who attained career milestones for the entire sample. Readily apparent are the lower proportions of CARRIER officers who attained career milestones compared with other officers initially assigned to other ship types. This trend occurs in all career milestones.

The data reveal CARRIER officers attained career milestones in lower proportions than all other officers. For CARRIER officers, the proportion of SWO-qualified officers is 21 percentage points lower than the next highest rate (78 percent of CLF officers obtained SWO qualification). As for other career milestones, the proportion of CARRIER officers who attained a milestone was consistently lower in all cases, varying between 4 to 6 percentage points lower than the next highest category.

Table 13. Comparison of the Proportion of Surface Warfare Junior Officers (Entire Sample) Who Achieved or Failed to Attain a Career Milestone by Career Milestone and Initial Ship Assignment (TYPE), 1976-1990

Career Milestone	CRUDES Freq (%)	AMPHIB Freq (%)	CARRIER Freq (%)	CLF Freq (%)
<b>SWO Qualified</b>				
YES	3,992 (82.8)	1,345 (79.2)	569 (57.0)	567 (77.7)
NO	832 (17.2)	353 (20.8)	429 (43.0)	173 (22.3)
<b>Department Head Screened</b>				
YES	1,806 (37.4)	650 (38.3)	298 (29.9)	266 (35.9)
NO	3,018 (62.6)	1,048 (61.7)	700 (70.1)	474 (64.1)
<b>Promoted to LT and LTjg in 49 &amp; 24 mos</b>				
YES	4,478 (92.8)	1,582 (93.2)	897 (89.9)	684 (92.4)
NO	346 (7.2)	116 (6.8)	101 (10.1)	56 (7.6)
<b>Promoted to LCDR</b>				
YES	1,506 (31.2)	477 (28.1)	179 (17.9)	167 (22.6)
NO	3,318 (68.8)	1,221 (71.9)	819 (82.1)	573 (77.4)
Total	4,824 (100.0)	1,698 (100.0)	998 (100.0)	740 (100.0)

Source: Derived from data provided by the Center for Naval Analyses.

Note: Proportions are based on (Number per Category)/(Total).

#### **b. Causes**

Since CARRIER and CLF officers separated despite attaining career milestones, it is possible that the reasons for separation may be related to the ability of CARRIER and CLF officers to attain additional career milestones later in their career (i.e., Executive Officer screen and Command at Sea Qualifications). Experience and qualifications earned during one's initial assignment may not readily translate to other ship types. Officers who can quickly adapt to their current assignment remain competitive. Officers who cannot make the transition to their current assignment lag behind.

## **10. Lateral Transfer**

Table 14 shows the proportion of Surface Warfare junior officers who laterally transferred out of the Surface community. Both leavers and stayers were included in the analysis.

### **a. Trends**

AMPHIB officers tend to change designator more readily than officers who were initially assigned to other ship types. About 54 percent of AMPHIB officers opted to change designator. The next highest proportion is about 23 percentage points lower than AMPHIB officers and occurs among CLF officers.

### **b. Causes**

A possible cause for this trend may be related to AMPHIB officers who attained career milestones but perceived themselves to be disadvantaged against their peers onboard other ship types. Moreover, referring back to Table 13, the results provide a possible explanation for the relatively high proportion of AMPHIB officers who were selected for lateral transfer. That is, the proportion of AMPHIB officers who were SWO-qualified is higher than the proportion of CARRIER and CLF officers who are SWO-qualified. Since a prerequisite for lateral transfer is SWO qualification, AMPHIB officers have more officers eligible to lateral transfer than CARRIER and CLF officers.

Table 14. Proportion of Surface Warfare Junior Officers (Entire Sample) Who Laterally Transferred out of the Surface Community by Initial Ship Assignment (TYPE), 1976-1990

Lateral Transfer	CRUDES Freq (%)	AMPHIB Freq (%)	CARRIER Freq (%)	CLF Freq (%)
YES	1,434 (29.7)	917 (54.0)	293 (29.4)	230 (31.1)
NO	3,390 (70.3)	781 (46.0)	705 (70.6)	510 (68.9)
Total	4,824 (100.0)	1,698 (100.0)	998 (100.0)	740 (100.0)

Source: Derived from data provided by the Center for Naval Analyses.

Note: Proportions are based on (Number per Category)/(Total).

### C. LOGIT ANALYSES

This section determines the significant variables for separation and provides common characteristics of leavers. A logit model was developed and subsequent variations used to extract significant explanatory variables (Wald Chi-square > 4.00) for each career phase. Based on the logit results, descriptions of leavers for each career phase are provided. The following is an overview of these results for each career phase.

#### 1. TERMER Phase

Appendix B, Table 3-A provides the results of the logit model for the TERMER phase.

##### a. Significant Variables

The results reveal that ship type is not significant. Instead, performance and personal and



characteristics are more influential to the separation decision.

Significant performance characteristics are department head screens, lateral transfers, and SWO qualification. Successful attainment of these performance characteristics decreased the likelihood of separation.

Significant personal characteristics are age, marital status at the Lieutenant rank, graduate education and college GPA, and race. As age at accession increased, the likelihood of separation decreased. Lieutenants who were married, black officers, officers with graduate education, and officers with low GPAs tend to stay in the Navy. Naval Academy and NROTC graduates and officers with high GPAs were are apparently more likely to separate from the Navy than OCS graduates and officers without high GPAs, respectively.

***b. Common Characteristics of Leavers***

Based on the significant variables identified above, the following common characteristics of officers who separated at the end of their MSR are provided:

- Average age at accession was about 22 years old.
- About 27 percent were married as Lieutenants.
- About 3 percent were Black (percentage of Black for entire sample was 6 percent).

- Less than 2 percent earned a graduate degree, 17.5 percent had high GPAs, and about 7 percent had low GPAs.
- About 38 percent were Naval Academy graduates, and 54 percent were NROTC graduates.
- Only 13 percent were successfully screened for department head, about 38 percent transferred out of the Surface community, and 56 percent were SWO-qualified.

## 2. DOUBTER Phase

Appendix B, Table 3-B provides the results of the logit model for the DOUBTER phase.

### a. *Significant Variables*

The results, as in the TERMER phase, reveal that ship type is not significant. Personal and performance characteristics again remained the major influencers to separation.

Significant performance characteristics are similar to the performance characteristics in the TERMER phase. However, in the DOUBTER phase, SWO qualification is no longer significant.

Significant personal characteristics are age, marital status at accession and at the Lieutenant rank, graduate education and college GPA, and accession source. Race is no longer significant, as in the TERMER phase.

Similar effects observed in the TERMER phase also occurred in the DOUBTER phase for the majority of the significant variables. As age at accession, increased the likelihood of separation decreased. Officers who were

married at accession or were "divorced" (defined as married at accession but single at Lieutenant rank) tended to remain in the Navy, whereas officers who were married as Lieutenants separated. Officers with a graduate degree or low college GPA had lower likelihoods of separation than their respective counterparts.

As for Naval Academy and NROTC graduates, the effect of accession source on separation reversed. That is, both, Naval Academy and NROTC graduates were less likely to separate than OCS graduates.

*b. Common Characteristics*

Based on the significant variables identified above, the following common characteristics of officers who separated after MSR and before the LCDR Board are provided:

- Average age was about 24 years old.
- About 13 percent were married at accession; 35 percent were married as Lieutenants, and 3 percent were "divorced."
- Four percent had graduate degrees, 23 percent had high GPAs, and 6 percent had low GPAs.
- Fifteen and 19 percent were Naval Academy and NROTC graduates, respectively.
- Twenty-nine and 19 percent were screened for department head and selected for lateral transfer, respectively.

### 3. CAREER Phase

Appendix B, Table 3-C provides the results of the logit model for the CAREER phase.

#### a. *Significant Variables*

The results again reveal that ship type is not significant. As before, personal and performance characteristics remain significant.

Significant performance factors are promotion to Lieutenant Commander, promotion to Lieutenant and Lieutenant Junior Grade, and SWO qualification. In all cases, the variables are positively correlated to separation in the CAREER phase. This appears to conflict with expectations that advancement and qualification would be conducive to retention. However, closer analysis reveals that the majority of the officers who remained up to or past the 0-4 board were SWO qualified, promoted to 0-4, and screened for department head.

A possible explanation for this is that, in the CAREER phase, persons passed over for 0-4, taking longer to promote, and department-head-screened were less likely to remain in the Navy while waiting for mandatory separation. (The CAREER phase sample consists of officers who remained in service up to and/or past the LCDR Promotion Board.)

As for personal characteristics, age at accession, marital status, graduate education, and accession

source were all found to be significant. The effect of age at accession continued to be significant; however, in the CAREER phase, as age increased, the likelihood of separation increased (previously, age increases were conducive to retention). The effects of marital status in the Career phase mirrored the effects in the DOUBTER phase. Officers who were married at accession or were "divorced" were less likely to separate, while officers married as Lieutenants were more likely to separate. Officers with graduate degrees were less likely to separate, and NROTC graduates were more likely to separate.

***b. Common Characteristics***

Based on the significant variables identified above, the following common characteristics of officers who separated at or after the LCDR Board are provided:

- Average age at accession was about 25 years old.
- About 27 percent were married at accession, 57 percent were married as Lieutenants, and less than 2 percent were "divorced."
- Thirty percent earned graduate degrees.
- About 23 percent were NROTC graduates, 57 percent were OCS graduates, and 20 percent were Naval Academy graduates.
- About 95 percent attained 0-2 and 0-3 officer grades within 24 and 49 months of accession, respectively, 56 percent were promoted to 0-4, and 92 percent were SWO qualified.

#### **4. Exploratory Analysis**

This section incorporated fitness reporting measures in the second data set (provided by Bowman), included an interactive variable related to race and ship type in the first data set (provide by CNA), and examined the likelihood of SWO qualification by ship type and initial ship assignment by race.

##### **a. Performance Measures**

Fitrep performance data were included in a second logit model for officers described in the data set developed by Bowman. The main purpose was to determine the significance of performance measures (i.e., recommended for accelerated promotion [RAP]) on separation.

(1) Significance. RAPs as a Lieutenant Junior Grade were significant and negatively correlated to separation; RAPs as an Ensign were not significant (Wald-Chi squares were 13.9543 and 2.5909 for RAPs as a Lieutenant Junior Grade and an Ensign, respectively).

(2) Interpretation. Since Ensign fitness reports were not significant, but Lieutenant Junior Grade fitness reports were significant, the data suggest that an officer's early performance does not weigh heavily into the separation decision as opposed to later performance as a Lieutenant Junior Grade. This may be a result of fitness

reports that are closer to one's MSR have more bearing than fitness reports received at the beginning of a Naval career.

(3) Limitation. Officer Fitness Report data were not available for officers described in the CNA data set. Consequently, this constituted a limitation to the analysis.

**b. Interactive Variable**

An interactive variable (AMP\_MIN) was introduced in the logit model for the CNA data set. The purpose was to determine the significance of the combined effects of race and ship type on separation. In this case, AMP\_MIN was created to describe the effects of minorities who were initially assigned to AMPHIBS.

(1) Significance. Logit analysis revealed AMPHIB, race, and AMP\_MIN were not significant (all variables had Wald-Chi squares less than 4.0).

(2) Interpretation. Since AMPHIB, race, and AMP\_MIN were not significant, it appears that their combined effects on separation have less bearing on separation than previous performance and personal characteristics addressed in the original logit model used above.

**c. Indirect Effects**

As addressed in the literature review, Bellamy (1991) conducted a study of the effects of race on

officer performance. One aspect of Bellamy's study dealt with the indirect effects of race and ship type on initial assignment and SWO qualification, respectively. Findings revealed that Black officers were more likely to be initially assigned to an AMPHIB than White officers, and AMPHIB officers were less likely to obtain SWO qualification than CRUDES officers. (Bellamy, 1991).

Similarly, this section incorporated Bellamy's analysis of race and performance to explore the indirect effects of race, ship type, and qualification on separation. Two models were developed for initial ship assignments and SWO qualification. Explanatory variables were similar to Bellamy's study and were based on college undergraduate performance (GPA) and race or ship type.

Table 15 provides the results of the logit analysis for the likelihood of initial assignment to a ship type by race and college performance. The results reveal that minority officers are more likely to be assigned to CLF and CARRIER ships than to CRUDES ships. Race was not significant for AMPHIB assignment. Additionally, officers with high GPAs are more likely to be assigned to CRUDES or CARRIER ships than to AMPHIB and CLF ships.



Table 15. Logit Regression Results for Initial Ship Assignment (TYPE)  
Warfare Junior Officers. 1976-1990

Variable	Coefficient	Wald Chi-square	Pr>Chi-square
CRUDES			
WHITE	reference		
BLACK	- 0.6679	48.9236	.0001
OTHER	- 0.2422	7.1751	.0074
AVG	reference		
TOP	+ 0.4000	32.3541	.0001
BOT	- 0.6011	49.8030	.0001
AMPHIB			
WHITE	reference		
BLACK	-----		
OTHER	-----		
AVG	reference		
TOP	- 0.6017	51.7867	.0001
BOT	+ 0.5814	41.3038	.0001
CARRIER			
WHITE	reference		
BLACK	+ 0.6806	32.3541	.0081
OTHER	-----		
AVG	reference		
TOP	+ 0.2269	7.0025	.0001
BOT	-----		
CLF			
WHITE	reference		
BLACK	+ 0.4155	8.8253	.0030
OTHER	+ 0.3468	6.1842	.0129
AVG	reference		
TOP	- 0.5054	32.3541	.0001
BOT	+ 0.2649	4.2354	.0396

Source: Derived from data provided by the Center for Naval Analyses.  
Model Chi-square: CRUDES 189.110 with 4 DF (p=0.0001)  
AMPHIB 121.146 with 4 DF (p=0.0001)  
CARRIER 35.440 with 4 DF (p=0.0001)  
CLF 45.228 with 4 DF (p=0.0001)

Table 16 provides the results of the logit analysis for the likelihood of qualification by ship type. The results reveal that CRUDES officers are more likely to obtain their SWO qualification. This is especially true

when CRUDES officers are compared with officers assigned to CARRIERS. The coefficient for CARRIER is negative and highly significant (at the 95% probability level).

Table 16. Logit Regression Results for Initial Ship Assignment (TYPE) Warfare Junior Officers. 1976-1990

Variable	Coefficient	Wald Chi-square	Pr>Chi-square
CRUDES	reference		
AMPHIB	- 0.2305	10.5864	.0012
CARRIER	- 1.2858	298.3742	.0001
CLF	- 0.3811	16.1479	.0001

Source: Derived from data provided by the Center for Naval Analyses.  
Model Chi-square: 286.925 with 3 DF (p=0.0001)

#### D. SUMMARY

The study first identified differences in officer separation rates among four ship types, indicating a connection between ship type and separation. Further analysis of the separation rates reveal disparities in the attainment of career milestones and the effects of personal characteristics.

To study these differences as they interrelate, logit analyses were used to extract significant variables, revealing that performance and personal characteristics are more influential in the separation decision than one's initial ship assignment.

The study explored the effects of variables addressed in a study by Bellamy (1991). The results support Bellamy's

findings that CRUDES assignment is conducive to SWO qualification. More important, the results suggest that initial ship assignment and the likelihood of SWO qualification are closely related.

Consequently, the analyses indicate that the effect of ship type on the separation decision revolves around the interrelation of ship type with various personal and performance characteristics. That is, the combined effects of ship type and other factors play a larger role in the decision to separate than the effect of any single factor.

## V. CONCLUSIONS AND RECOMMENDATIONS

### A. CONCLUSIONS

#### 1. Primary Focus: Ship Type

This study's primary focus is the relationship between initial ship assignment and separation by Surface Warfare junior officers. The results suggest that an *interrelationship* between three factors -- ship type, performance, and personal characteristics -- is more an indicator of separation than any one single factor. As an officer progresses into his or her Naval career, the combined effect of the factors gains or loses importance with respect to the career decision. The following is a summary of the study's findings concerning the relationship between ship type and separation.

Initial ship assignment to an aircraft carrier may not be conducive to retention. Although logit analyses indicate ship type is not significant with respect to separation, the study as a whole identifies separation trends that argue to the contrary. First, officers who were initially assigned to an aircraft carrier (CARRIER) had the highest separation rates compared with officers who were initially assigned to a cruiser/destroyer (CRUDES), amphibious (AMPHIB), or combat logistic forces (CLF) ship.

Moreover, CARRIER ships had the lowest proportion of SWO-qualified junior officers or officers screened for Department Head.

These performance characteristics alone suggest that assignment to an aircraft carrier may be problematic. Two additional separation trends based on personal characteristics solidify the conclusion. First, officers in all three grade point average (GPA) categories separated at the highest rate when initially assigned to a CARRIER. Second, both Black and White officers who were initially assigned to a CARRIER had higher separation rates when compared with their counterparts assigned to all other ship types.

The indirect effects of race and GPA on performance and initial assignment continue to hold true (Bellamy, 1991; Mehay, 1995) for certain officers and ship types. However, CARRIER officers are an exception. Logit analyses generally reveal results similar those of Bellamy (1991). That is, relatively higher college GPAs increase the likelihood of initial assignment to CRUDES; minority status decreases the likelihood of initial assignment to CRUDES; and initial assignment to an AMPHIB decreases the likelihood of SWO qualification. Thus, AMPHIB officers are more likely to separate than CRUDES officers. For CARRIER officers, the indirect effect of race and GPA play less a role on the separation decision. Both Black and White

officers and officers in all three GPA categories tend to separate at similarly high rates compared with their counterparts assigned to other ship types. Thus, race and GPA was not an indicator of separation for CARRIER officers.

Initial ship assignment to an aircraft carrier or combat logistic forces ship may not be career enhancing for officers who are seeking promotion to Lieutenant Commander (LCDR). Officers who were initially assigned to a CARRIER or CLF ship exhibited similar separation trends with respect to promotion to LCDR. The data reveal that CARRIER and CLF officers are not being promoted in the same proportion as are those assigned to CRUDES and AMPHIB. On average, CARRIER and CLF ships have lower proportions of officers who were selected for LCDR. Additionally, officers who were initially assigned to a CARRIER or CLF and promoted to LCDR had higher separation rates than their counterparts who were initially assigned to AMPHIB and CRUDES.

This study was unable to specify why CARRIER and CLF officers were separating. However, it is possible that CARRIER and CLF officers lacked the required knowledge and experience that others gained onboard CRUDES and AMPHIB ships. Thus, a larger proportion of CARRIER and CLF officers who were promoted to LCDR may not have been able to compete well with other officers for mid-level career milestones, such as selection for executive officer.

Initial assignment to a cruiser/destroyer is apparently conducive to retention as well as career advancement. Separation rates based on ship type reveal that officers who were initially assigned to a CRUDES ship have the lowest separation rates among the four ship types defined in the study. Moreover, CRUDES ships have the highest proportion of SWO-qualified officers, timely promotions to Lieutenant and Lieutenant Junior Grade (in 49 and 24 months, respectively), and LCDR promotions. The rate of selection for Department Head was slightly lower than that of officers assigned to AMPHIBs, but remained well above the rate for CARRIER and CLF. Furthermore, the separation rates for CRUDES officers promoted to LCDR were the lowest among all the ship types.

## **2. Secondary Issues**

In addition to the above, the study revealed several other findings not directly related to ship type. The following is a brief summary of these findings:

- Initial assignment based on GPA continues to be an issue. For CARRIERS, GPA played less of a role in the separation decision. Nevertheless, logit analyses reveal GPA was a significant determinant of initial ship assignment.
- Initial assignment based on the indirect effects of GPA and race is important. Minority officers were less likely to be assigned to a CRUDES ship. At the same time, non-minority officers were less likely to be assigned to a non-CRUDES ship.

- Graduate education has a minimal effect on officer separation throughout all three career phases defined in the study.
- Officers married as Lieutenants are more likely to separate than those married at accession or divorced (Variable does not account for change in marital status between accession and Lieutenant due to data limitations from the originator).
- Officers with high GPAs are more likely to separate before the 0-4 Promotion Board, and officers with low GPAs are less likely to separate before the 0-4 Promotion Board. After the 0-4 Promotion Board (CAREER phase), GPA is not significant.
- At the end of MSR, Naval Academy and NROTC graduates tend to separate more readily than OCS graduates. However, Naval Academy and NROTC graduates who continue after MSR are more apt to stay in the Navy.
- AMPHIB officers tend to remain in the Navy, but laterally transfer out of the Surface community in higher proportions than officers initially assigned to other ship types. Moreover, those who do separate stay in service longer before separating.
- The highest separation rates consistently occur during the years between MSR and the 0-4 Promotion Board.
- The tendency of officers passed over for LCDR is to remain in the Navy at least to the 12-year point (data are limited to 12 years, therefore individuals who accumulate 12 years service are stayers in the CAREER phase).

## **B. RECOMMENDATIONS**

As previously observed, this study was limited based on predefined variables in the data set. For example, the ship TYPE variable could not be divided into ship classes for the CNA data set; and, for the second data set (developed by Bowman), the sample was limited to officers who stayed in



the Navy at least to the LCDR Promotion Board.

Consequently, the two samples could not be compared.

Moreover, the time period analyzed did not account for the effects of performance and personal characteristics in the latter part of a Naval Career.

Future studies of the separation decision of Surface Warfare junior officers should focus on obtaining data that cover the time period from accession to the Executive Officer Screening Board. Ideally, the data should include variables that describe performance measures and each ship class. Individual unit identification apparently holds less importance than the class variable, due to the high turnover among personnel.

Future studies should also examine current policies with regard to the effectiveness of Surface Warfare training and the initial billeting process. That is, analyses should be conducted to determine if junior officers are receiving the proper training with respect to SWO qualifications and Department Head assignments. Additionally, the effectiveness of college GPA as an assignment criterion should be investigated.

The Navy already has a policy in effect that permits junior officers to gain experience and qualifications that are not specific to their initial ship assignment. Specifically, cross-deck training, split-tours, and second-tour division officer assignments

expose junior officers to a wide variety of training. The result is a well-rounded officer prepared to contribute personal experience and knowledge to all areas of the Surface community.

However, this policy may not be working for officers assigned to certain ships. The data suggest that the Navy may want to examine the extent to which this policy has been implemented and its effect on retention.

A study of this type would benefit from interviews or surveys conducted with personnel from the level of CO to the junior officer. Such information would provide valuable insight into the current perceptions and values related to separation, and possibly substantiate recent exit surveys. Variables such as deployment schedules, operational tempo, and the working spouse should be included to examine the conflict between an officer's responsibilities to his or her family and the Navy.



## APPENDIX A

Variables	Description
MSR	Minimum service requirements. Different for respective accession sources: USNA = 5 years, ROTC = 4 years, and OCS = 3 years.
TERMER	Career phase for officers who completed MSR (entire sample).
DOUBTER	Career phase for officers who remained in Naval service after MSR (officers who separated at MSR were omitted).
CAREER	Career phase variable for officers who remained in Naval service up to or past the LCDR Promotion Board (officers who separated before promotion board were omitted).
SEP	Voluntary separation prior to Lieutenant Commander Promotion Board.
SEP_A	Voluntary separation for all career phases.
SEP_T	Voluntary separation for officers who separated in the TERMER career phase.
SEP_D	Voluntary separation for officers who separated in the DOUBTER career phase.
SEP_C	Voluntary separation for officers who separated in the CAREER phase.
AGE	Denotes officers age at accession.
WHITE	Caucasian officers.
BLACK	African-American officers.
OTHER	Hispanic, Asian, and other race/ethnicity.
MRRD_ACC	Officers married at accession.
MRRD_3	Officers married as Lieutenants.

DIVD	Officers who were married at accession but were single as Lieutenants.
MSTR	Officers who earned graduate degrees.
TOP	Officers with high college GPAs (>3.2).
AVG	Officers with average college GPAs (2.2<GPA<3.2).
BOT	Officers with low college GPAs (<2.2).
USNA	Accession source via Naval Academy.
NROTC	Accession source via Naval Reserve Officer's Training Corps.
OCS	Accession source via Officer Candidate's School.
PACK_P	Officers who were promoted to O2 and O3 officers grades within 24 and 49 months of accession.
PACK_DH	Officers who screened for Department Head.
D_QUAL	Officers who lateral transferred out of the Surface community.
QUAL	Officers who qualified Surface Warfare Officer (SWO).
PROMOTE4	Officers who were promoted to LCDR.
RAP01	Officers who received recommendations for early promotions on all their Ensign Officer Fitness Reports.
RAP02	Officers who received recommendations for early promotions on all their Lieutenant junior grade Officer Fitness Reports.
AMP_MIN	Officers who were categorized into a minority category and initially assigned to amphibious ships

CRUDES	Denotes initial assignment to a frigate, destroyer, cruiser, or battleship.
AMPHIB	Denotes initial assignment to an amphibious ship.
CARRIER	Denotes initial assignment to an aircraft carrier.
CLF	Denotes initial assignment to an auxiliary ship (Combat Logistic Force).



## APPENDIX B

Table 1. Frequencies and Percentages of Explanatory Variables

Variable	Frequency (Number of Sample)	Percent of sample
MRRD_ACC	1,401	17.0
MRRD_3	3,488	42.2
DIV	246	3.0
WHITE	7,220	87.4
BLACK	502	6.1
OTHER	538	6.5
MSTR	1,718	20.8
TOP	1,508	18.3
AVG	6,111	74.0
BOT	641	7.8
USNA	1,768	21.4
OCS	4,370	52.9
ROTC	2,122	25.7
PACK_P	7,641	92.5
PROMOTE4	2,329	28.2
PACK_DH	3,020	36.6
D_QUAL	2,474	30.0
QUAL	6,473	78.4
TERMER	705	8.5
DOUBTER	2,507	30.4
CAREER	5,048	61.1
CRUDES	4,824	58.4
AMPHIB	1,698	20.6
CARR	998	12.1
CLF	740	9.0
Total Sample	8,260	100.0

Variable abbreviations are described in Appendix A.

Source: Derived from data provided by the Center for Naval Analyses.



Table 2. Separation Rates of Surface Warfare Junior Officers Who Remained in Service up to the 0-4 Promotion Board by Initial Assignment (UNIT), 1986-1994

Unit Hull #	Total Onboard	Number of Leavers	Separation Rate
[70% or above separation rates]			
AFS-1	3	3	100.0
AO-98	3	3	100.0
LPD-1	3	3	100.0
LST-1197	3	3	100.0
DD-951	6	5	83.3
DD-937	5	4	80.0
LSD-35	5	4	80.0
MSO-437	5	4	80.0
LHA-2	4	3	75.0
LHA-3	4	3	75.0
AOR-5	4	3	75.0
CG-21	11	8	72.7
CV-62	7	5	71.4

Source: Derived from data provided by William Bowman, Department of Economics, U.S. Naval Academy.

Note: Data are restricted to ships having 50 percent or greater separation rates and with at least three officers who remain in the Navy up to the 0-4 Promotion Board.

Table 2 (cont). Separation Rates of Surface Warfare Junior Officers Who Remained in Service up to the 0-4 Promotion Board by Initial Assignment (UNIT), 1986-1994

Unit Hull #	Total Onboard	Number of Leavers	Separation Rate
[60-69% separation rates]			
FF-1059	7	4	67.1
AFS-3	6	4	66.7
AO-148	3	2	66.7
AOR-2	3	2	66.7
DD-943	3	2	66.7
FFG-3	3	2	66.7
FFG-7	3	2	66.7
LPD-2	3	2	66.7
LPH-7	3	2	66.7
LST-1179	3	2	66.7
LST 1195	3	2	66.7
MSO-442	3	2	66.7
MSO-492	3	2	66.7
DDG-31	8	5	62.5
CGN-40	5	3	60.0
CV-66	10	6	60.0
FF-1071	5	3	60.0
LCC-19	5	3	60.0
LKA-115	5	3	60.0
LSD-39	5	3	60.0
LPH-3	5	3	60.0

Source: Derived from data provided by William Bowman, Department of Economics, U.S. Naval Academy.

Note: Data are restricted to ships having 50 percent or greater separation rates and with at least three officers who remain in the Navy up to the 0-4 Promotion Board.

Table 2 (cont). Separation Rates of Surface Warfare Junior Officers Who Remained in Service up to the 0-4 Promotion Board by Initial Assignment (UNIT), 1986-1994

Unit Hull #	Total Onboard	Number of Leavers	Separation Rate
[50-59% separation rates]			
DDG-23	7	4	57.1
DDG-38	7	4	57.1
LST-1190	7	4	57.1
LST-1192	7	4	57.1
CG-24	9	5	55.6
DD-978	11	6	54.6
DDG-8	11	6	54.6
CV-64	13	7	53.8
CVN-68	25	13	52.0
AE-32	6	3	50.0
CG-18	4	2	50.0
CG-28	6	3	50.0
CG-29	4	2	50.0
CGN-25	12	6	50.0
DD-933	4	2	50.0
DD-946	6	3	50.0
DD-973	6	3	50.0
FFG-4	6	3	50.0
FF-1081	6	3	50.0
FF-1086	4	2	50.0
FF-1092	12	6	50.0
LSD-29	4	2	50.0
LSD-30	4	2	50.0
LSD-36	6	3	50.0
LST-1187	4	2	50.0

Source: Derived from data provided by William Bowman, Department of Economics, U.S. Naval Academy.

Note: Data are restricted to ships having 50 percent or greater separation rates and with at least three officers who remain in the Navy up to the 0-4 Promotion Board.

Table 3-A. Logit Regression Results (significant variables) for Surface Warfare Junior Officers in the TERMER Phase, 1976-1990

Variable	Coefficient	Wald Chi-square	Pr>Chi-square
AGE	- 0.1100	8.7764	.0031
MRRD_3	- 0.3903	12.8538	.0003
WHITE	reference		
BLACK	- 0.8606	12.2238	.0005
OTHER	-----		
MSTR	- 2.9975	76.4164	.0001
AVG	reference		
TOP	+ 0.2762	4.3753	.0257
BOT	- 0.4073	5.5962	.0180
OCS	reference		
USNA	+ 3.0307	264.3080	.0001
ROTC	+ 2.8517	262.0052	.0001
PACK_P	-----		
PACK_DH	- 1.0618	68.4411	.0001
D_QUAL	- 0.3743	12.3845	.0004
QUAL	- 1.0612	88.0405	.0001
CRUDES	reference		
AMPHIB	-----		
CARR	-----		
CLF	-----		

Source: Derived from data provided by the Center for Naval Analyses.

Model Chi-square=1338.609 with 17 DF (p=0.0001)

SEP =  $X_1(\text{AGE}) + X_2(\text{MARITAL STATUS})_{DV3} + X_3(\text{RACE})_{DV3} + X_4(\text{EDUCATION})_{DV4} + X_5(\text{PERFORMANCE})_{DV5} + X_6(\text{SHIP TYPE})_{DV4}$

Table 3-B. Logit Regression Results (significant variables) for Surface Warfare Junior Officers in the DOUBTER Phase, 1976-1990

Variable	Coefficient	Wald Chi-square	Pr>Chi-square
AGE	- 0.0974	52.8080	.0001
MRRD_ACC	- 0.4961	8.2527	.0041
MRRD_3	+ 0.5137	7.2070	.0073
DIV	- 0.5038	6.2629	.0123
WHITE	reference		
BLACK	-----		
OTHER	-----		
MSTR	- 1.2060	88.2108	.0001
AVG	reference		
TOP	+ 0.3784	23.9836	.0001
BOT	- 0.2393	4.0160	.0451
OCS	reference		
USNA	- 0.2852	8.6308	.0033
ROTC	- 0.4969	34.0401	.0001
PACK_P	-----		
PACK_DH	- 0.4197	35.2920	.0001
D_QUAL	- 0.6141	64.2965	.0001
QUAL	-----		
CRUDES	reference		
AMPHIB	-----		
CARR	-----		
CLF	-----		

Source: Derived from data provided by the Center for Naval Analyses.

Model Chi-square=1987.883 with 19 DF (p=0.0001)

SEP =  $X_1(\text{AGE}) + X_2(\text{MARITAL STATUS})_{DV3} + X_3(\text{RACE})_{DV3} + X_4(\text{EDUCATION})_{DV4} + X_5(\text{PERFORMANCE})_{DV5} + X_6(\text{SHIP TYPE})_{DV4}$

Table 3-C. Logit Regression Results (significant variables) for Surface Warfare Junior Officers in the DOUBTER Phase, 1976-1990

Variable	Coefficient	Wald Chi-square	Pr>Chi-square
AGE	+ 0.1243	59.8070	.0001
MRRD_ACC	- 0.7376	4.5787	.0324
MRRD_3	+ 1.0652	9.2951	.0023
DIV	- 1.0210	8.0213	.0046
WHITE	reference		
BLACK			
OTHER			
MSTR	- 0.2950	9.0393	.0026
AVG	reference		
TOP	-----		
BOT	-----		
OCS	reference		
USNA	-----		
ROTC	+ 0.4298	11.4503	.0007
PACK_P	+ 0.5873	8.5922	.0034
PROMOTE4	+ 0.3057	10.6890	.0011
PACK_DH	-----		
D_QUAL	-----		
QUAL	+ 1.0210	39.5426	.0001
CRUDES	reference		
AMPHIB	-----		
CARR	-----		
CLF	-----		

Source: Derived from data provided by the Center for Naval Analyses.

Model Chi-square=210.383 with 19 DF (p=0.0001)

SEP =  $X_1(\text{AGE}) + X_2(\text{MARITAL STATUS})_{DV3} + X_3(\text{RACE})_{DV3} + X_4(\text{EDUCATION})_{DV4} + X_5(\text{PERFORMANCE})_{DV5} + X_6(\text{SHIP TYPE})_{DV4}$



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